

Claim 32 recites a method of forming a floating gate transistor comprising forming a gate insulator comprising silicon dioxide (SiO_2) on a substrate, and forming a floating gate on the gate insulator, the floating gate comprising gallium nitride (GaN) or gallium aluminum nitride (GaAlN).

With regard to Figure 7(e) mentioned in the final Office Action, the fabrication of a device shown in Figures 7(a) to 7(e) is described between column 15, line 56 and column 16, line 67. There is no mention in this text of gallium nitride (GaN) or gallium aluminum nitride (GaAlN).

Hori shows a semiconductor device in Figure 15(a) that corresponds to the text in column 25 that was cited in the final Office Action. The semiconductor device shown in Figure 15(a) has a substrate 1, a first barrier region 14, a storage region 11, a second barrier region 15, and an electrode 6. The first barrier region 14 includes a low barrier region 12 between two tunneling barriers 13a and 13b. Hori, column 24, lines 34-49. Hori shows particular combinations of materials from which these elements are made:

“Concrete examples of *combination* of materials for the tunneling barriers 13a, 13b and storage region 11 include AlAs and GaAs, SiO_2 and Si, GaAlAs and GaAs, SiO_2 and SiC, Si_3N_4 and Si, GaAlN and GaN, or Si and SiGe.”[Emphasis Added] Hori, column 25, lines 18-22.

Hori then says:

“In this case, for example, the second barrier regions 15 are made of SiO_2 of 5 to 30 nm in thickness. tunneling barriers 13a, 13b of SiO_2 of 2-5 nm in thickness. and the low barrier region 12 and storage regions 11 of SiC and Si of 5 to 30 nm in thickness, respectively.” Hori, column 25, lines 42-48

It is clear from this text that Hori is disclosing *specific combinations* of materials for the device shown in Figure 15(a). None of the combinations shown by Hori include either GaN or GaAlN and SiO_2 . This is consistent with the Summary of the Invention section of Hori which states:

“In case that the tunneling barrier in the conductive carrier storage part is made of GaAlN thin film, the storage regions and low barrier region in the conductive

carrier storage part may be made of GaN thin film." Hori, column 7, lines 64-67.

Therefore Hori does not show or suggest forming a gate insulator comprising silicon dioxide (SiO_2) on a substrate, and forming a floating gate on the gate insulator, the floating gate comprising gallium nitride (GaN) or gallium aluminum nitride (GaAlN) as recited in claim 32. The applicant respectfully submits that Hori does not show or suggest all of the elements recited in claim 32, and that claim 32 is in condition for allowance. Claim 33 is dependent on claim 32, and recites further limitations with respect to claim 32. For reasons analogous to those stated above, and the limitations in the claim, the applicant respectfully submits that claim 33 is not shown or suggested by Hori, and that claim 33 is in condition for allowance. Claims 24, 30, 37, 38, 42, and 43 recite elements similar to the elements recited in claim 32. For reasons analogous to those stated above, and the limitations in the claims, the applicant respectfully submits that claims 24, 30, 37, 38, 42, and 43 are not shown or suggested by Hori, and that claims 24, 30, 37, 38, 42, and 43 are in condition for allowance.

Claim 47 recites a method of forming a floating gate transistor comprising forming a gate insulator on a substrate, and forming a floating gate on the gate insulator, the floating gate comprising gallium aluminum nitride (GaAlN).

Hori does not show or suggest a floating gate comprising gallium aluminum nitride (GaAlN) as is recited in claim 47. None of the combinations of materials in the text quoted above from Hori show a storage region of GaAlN.

The applicant respectfully submits that Hori does not show or suggest all of the elements recited in claim 47, and that claim 47 is in condition for allowance. Claim 48 is dependent on claim 47, and recites further limitations with respect to claim 47. For reasons analogous to those stated above, and the limitations in the claim, the applicant respectfully submits that claim 48 is not shown or suggested by Hori, and that claim 48 is in condition for allowance. Claims 52, 53, 57, and 58 recite elements similar to the elements recited in claim 47. For reasons analogous to those stated above, and the limitations in the claims, the applicant respectfully submits that claims 52, 53, 57, and 58 are not shown or suggested by Hori, and that claims 52, 53, 57, and 58 are in condition for allowance.

Claims 25-26, 31, 34-36, 39-41, 44-46, 49-51, 54-56 and 59-61 were rejected under 35 USC § 103(a) as being unpatentable over Hori in view of Major et al. (U.S. Patent No. 6,130,147, Major). The applicant respectfully traverses.

The requirements for a rejection under §103 are set out in the MPEP:

“To establish a *prima facie* case of obviousness ... there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings.” MPEP 2143.

A recent Federal Circuit opinion, *In re Lee*, 61 USPQ2d 1430 (Fed. Cir. 2002), specifically requires that the suggestion or motivation to combine references “be based on objective evidence of record.” The court also stated that “[t]his factual question of motivation is material to patentability, and could not be resolved on subjective belief and unknown authority.” Another Federal Circuit opinion states that the suggestion or motivation to combine references must be found in the prior art. MPEP 2143 citing *In re Vaeck*, 20 USPQ2d 1438, 1442 (Fed. Cir. 1991).

The final Office Action stated:

“it would have been obvious to one having ordinary skill in the art at the time of the invention was made to modify the Hori structure using the method of Major in order to operate the device in its intended use.” final Office Action, page 4.

This stated motivation is not supported by evidence in the record, as there is no reference to a document or other evidence where this motivation can be found as is required by *In re Lee*.

The applicant respectfully submits that a *prima facie* case of obviousness of claims 25-26, 31, 34-36, 39-41, 44-46, 49-51, 54-56 and 59-61 has **not** been established in the Office Action, and that claims 25-26, 31, 34-36, 39-41, 44-46, 49-51, 54-56 and 59-61 are in condition for allowance.